

COPYRIGHT AND PATENT PROTECTION OF CLOUD STORAGE SOFTWARE IN THE BRICS MEMBER STATES

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In the BRICS Member States, serious attention is paid to Information Technology development in terms of both technology and law. These countries are at the forefront in the development of the digital economy and digital innovations. Cloud storage software is an important element in this sector and is intensively applied in civil law transactions. The processes of approval, storage and sorting of documents are being automated on the basis of the relevant computer programs. This helps companies and government agencies to systemize their operations. At present, the most pressing issues are those related to copyright and copyright holders of computer programs since software code may be copied, even illegally or unconscientiously, and used as the basis for another software product. Cloud storage software is copyright-protected, but, depending on the scope of its use, additional patent protection may be required. Given the rapid development of the IT sector, a software product may be one of the components in an invention subject to patenting. The article focuses on the relationship between copyright and patent protection of software and offers a comparison of the approaches taken by the BRICS countries. Approaches taken by Germany as a European Union Member State and the United States of America are shown in the all-out comparison. The article also analyzes the views of academics on the relationship between copyright and patent protection of software.

Keywords: copyright; intellectual property; BRICS; Russia; China; India; Brazil; South Africa.

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Introduction

The transitional nature of the current state of affairs in all spheres of public life, in their both domestic and international aspects, has been noted with concern by social scientists. There are numerous reasons for such concern, but perhaps the most important is a perception of the existing regulators of public processes and laws lagging behind the rapid development of the economy, engineering and technology.

As noted in a recent article by Iu. Tikhomirov, E. Cherepanova and A. Tsomartova, new trends and changes in the development of laws, such as the interrelation and interdependence of international and national laws, as well as changes in the principles of economic development, justify the need for the identification of the limits to the impact of the law on a person and a citizen, as well as the limits to self-regulation in various spheres of social relationships.¹

The sixth technological stage, often defined as “post-technological,” raises a difficult question which legal experts have to answer, namely the question of how to and should one arrange for the new economic relationships that are beyond the customary legal formulas and frameworks and that may emerge, for example, in cybersphere or other spheres where business entities communicate. Furthermore, does all this necessitate the development of brand new and innovative mechanisms of legal regulation or the application of traditional legal frameworks accessible under existing laws, at least during the transitional period?

¹ Тихомиров Ю.А., Черепанова Е.В., Цомартова Ф.В. Правовые векторы реальных процессов – новый подход в теории // Государство и право. 2021. № 1. С. 9 [Iu.A. Tikhomirov et al., *Legal Vectors of Real Processes – A New Approach in Theory*, 1 State and Law 7, 9 (2021)].

According to M. Zaloilo, the goal of creating a digital economy, which has been proclaimed in Russia and many foreign countries, leads to the digitalization of law, allowing for the establishment of new regulators, such as quasi-legal ones, as well as the transformation of law into another social regulator.² Is that true? We will attempt to answer this question by investigating the capacity of traditional legal institutions and frameworks to regulate one of the most remote spheres of economy and technology, namely the sphere of cyberspace and, in particular, the cloud storage databases that make up the complex software³ and hardware combinations.

In our opinion, the analysis of ways and methods of protecting such intangible assets as cloud storage software that are unusual from the viewpoint of the existing legal frameworks requires a comparison of different approaches to this issue taken in the countries with the most developed regulatory methodologies, as well as an examination of international legal acts and practices applicable in the IT field.

This article is dedicated to the review of the basic means of legal protection afforded to computer programs that enable the formation and operation of cloud storage databases in the BRICS member states, as well as a comparison of these protections to those currently in place and being developed in the legal systems of Germany and the United States. According to T. Khabrieva, interaction within BRICS establishes specific objectives for legal science and opens up new prospects for mutually beneficial cooperation between Russia and other countries.⁴ A review of the approaches taken in the BRICS countries allows for an understanding of the national regulations on computer programs, particularly, in terms of their protection as intellectual property items.⁵ Given the rapid technological development of the BRICS countries and the sophistication of computer programs, the sharing of experience in regulation and adoption of the instruments of legal protection is undoubtedly of interest.

The BRICS member states work closely together in the legal regulation of intellectual property, as well as in the development of science and information

² Zaloilo M.B. Законность и целесообразность в обществе постмодерна: пересмотр сложившейся классической модели // Журнал российского права. 2020. № 6. С. 27 [Maxim V. Zaloilo, *Legality and Expediency in a Postmodern Society: A Revision of the Existing Classical Model*, 6 Journal of Russian Law 22, 27 (2020)].

³ For the purposes of this article, the terms “application software” and “computer program” have the same meaning.

⁴ Киберпространство БРИКС: правовое измерение: монография [Cyberspace BRICS: Legal Dimension: Monograph] 21 (Dan Rui ping & Talia Khabrieva eds., 2017).

⁵ Ахмадова М.А. Обеспечение охраны прав на интеллектуальную собственность, созданную при осуществлении совместной деятельности в рамках двусторонних соглашений России о научно-техническом сотрудничестве со странами БРИКС // Международное право и международные организации. 2019. № 3. С. 39 [Mariam A. Akhmadova, *Ensuring the Protection of Intellectual Property Rights Created in the Implementation of Joint Activities within the Framework of Bilateral Agreements of Russia on Scientific and Technical Cooperation with the BRICS Countries*, 3 International Law and International Organizations 38, 39 (2019)].

technologies. The use of cloud storage software is frequently trans-national in nature and it is also a factor of technological advancement. At present, Russia is a party to the following bilateral agreements:

- Agreement between the Government of the Russian Federation and the Government of the Republic of India on Scientific and Technological Cooperation dated 30 June 1994. In 2002, the parties signed the Intergovernmental Protocol on the Protection of Intellectual Property Rights which formed the legal basis for the development of innovative technologies.

- Agreement between the Government of the Russian Federation and the Government of the People's Republic of China on Scientific and Technological Cooperation dated 18 December 1992. In 1999, the parties signed the Intergovernmental Protocol on the Principles of Protection and Allocation of Intellectual Property Rights.

- Agreement between the Government of the Russian Federation and the Government of the Federative Republic of Brazil on Scientific and Technological Cooperation dated 21 November 1997.

- Agreement between the Government of the Russian Federation and the Government of the Republic of South Africa on Scientific and Technological Cooperation dated 14 October 2014. This Agreement includes an attachment titled "Intellectual Property and Confidential Information."

It is worth noting that, with the exception of the one between the Governments of Russia and Brazil, intellectual property is subdivided into the former and the created. The term "former" intellectual property refers to the property created before the start of the cooperation in the sphere of research, whereas "created" intellectual property refers to the product of such cooperation.

Such subdivision is not common for the national laws of the BRICS member states. The Civil Code of the Russian Federation does not define the former property, but some of its provisions govern the created one. For example, the Law No. 9.610 on Copyright and Related Rights of the Federative Republic of Brazil, enacted on 19 February 1998 does not contain any provisions regarding former intellectual property. On the other hand, the Copyright Act of India dated 4 June 1957 includes the provisions that regulate the creation of intellectual property. This law mentions previously created audio recordings that may be changed at the time when the original author is specified. The former intellectual property is not mentioned in the laws that govern the authors' rights in China and South Africa. In general, the regulation in these countries is aimed at the created intellectual property, namely, the final result.

These agreements help the member states in concretizing issues related to the allocation and protection of intellectual property, which is especially important for the computer programs that may be used via the Internet. Considering that intellectual property is of a territorial nature, that is, it is protected in the territory of the state where such protection is requested and, under the laws of this state, the effect of such multilateral agreements, such as the Berne Convention for the Protection of Literary

and Artistic Works of 1886, the Paris Convention for the Protection of Industrial Property of 1883, the Universal Copyright Convention of 1971 (South Africa is not a party to this Convention) among others, as well as specialized bilateral agreements, expands the opportunities of the author/copyright holders to protect their rights. The bilateral agreements focus on matters related to the protection of intellectual property, coordination, and definition of the parties' contributions to the elaboration of applications, thus enabling the countries to enhance their R&D efforts, bridge the gap in IT development, as well as avoid legal uncertainty and enhance further cooperation.⁶

Cloud data storage is a type of online data bank model that stores the data on servers provided to the clients.⁷ A cloud storage database is both an intangible asset (software with specific functions of data storage, as well as the execution of user commands related to data sorting and formatting) and a complex tangible asset (hardware that makes up a data processing center) (DPC). This technology is used by legal entities for the organization of workflows, as well as by individuals for their personal needs. Cloud storage technology is now being integrated into the operations of government agencies.

No cloud data storage project can be implemented in a DPC without the use of special equipment. Such a database can be applied in practice for the users, for instance, large legal entities that would use it for their work with major data arrays. Users may be able to access additional functions through cloud data storage. Cloud data storage is typically provided by legal entities (on rare occasions, by individual entrepreneurs) that are registered or recognized as such under the laws of the country in which they are engaged in entrepreneurial activities in the field of digital services. Such companies are large and have a complex structure because they have not only an administrative center, but also a R&D division that is responsible for the development and improvement of software.

Computer programs are a subset of intellectual property. They are classified as "literary works for copyright protection purposes"⁸ in the laws, but are not regarded as such in global practices. However, the development of software is considered a creative endeavor. In order to ensure, copyright protection an international copyright protection agreement in the form of the World Intellectual Property Organization (WIPO) Copyright Treaty was adopted in 1996. Computer programs are protected as literary works under Article 4 of this Treaty, as defined in Article 2 of the Berne Convention. Such protections apply to computer programs, regardless of the mode or form in which they are expressed. A key distinctive feature of a computer program as opposed to a literary work is the possibility of state registration.

⁶ *Regulating New Technologies in Uncertain Times* 150 (Leonie Reins ed., 2019).

⁷ Cesare Bartolini et al., *Property and the Cloud*, 34(2) *Comput. L. Secur. Rev.* 358, 361 (2018).

⁸ Близнац И.А., Леонтьев К.Б. Авторское право и смежные права: учебник [Ivan A. Bliznets & Konstantin B. Leontiev, *Copyright and Related Rights: Textbook*] 138 (Ivan A. Bliznets ed., 2018).

1. Legal Framework for Regulating Cloud Storage Software in Russia

Article 1261 of the Civil Code of the Russian Federation protects the copyright of a computer program, including its source code and object code. When running a program, audiovisual reflections of that program are displayed on the monitor screen, as are its name and preparatory materials (preparatory materials are compared to drafts of literary works and include additional information about that program, such as a user manual).⁹ The name of the program may also be protected by its copyright holder through registration, and its audiovisual depiction on the monitor screen is also subject to legal protection.¹⁰ Computer programs function with the goal of achieving a specific result. There is a wide range of functions for cloud data storage facilities, ranging from data sorting to editing and distribution of data.

When a computer program is being developed, the very act of creating it acknowledges the exclusive right to it. However, one cannot say that the program registration is merely a formality because it serves as the material cause for its protection in the event of a dispute. Copyright holders may use the “©” symbol in order to inform others of their copyright to a work. Computer programs that contain state secrets are not subject to state registration. Under Article 1262 of the Civil Code of the Russian Federation, computer programs are registered by submitting applications with the federal executive authority in charge of intellectual property which is in Moscow (Rospatent). If the application is approved, this authority would then issue the certificate of official registration to the applicant and publish the information about this registration in its official gazette.

The exclusive right to a computer program is held by its authors, their heirs or other persons who have received such right under the relevant law or contract. Authors of computer programs in Russia, India, China and other BRICS countries, as well as in Germany and the United States, have the right to distribute them, create derivatives based on them and demonstrate them in public (this right is somewhat different from the right to demonstrate a literary or artistic work, but such a program has an audiovisual image which may be displayed on a monitor screen). The copyright holders' rights to computer programs are absolute. It means that they are permitted to use such programs personally or allow others to use them.

It is necessary to draw attention to the fact that software applications are being constantly changed and improved. This is also relevant to cloud data storage. This

⁹ Гражданский кодекс Российской Федерации (часть четвертая) от 18 декабря 2006 г. № 230-ФЗ // СПС «КонсультантПлюс» [Civil Code of the Russian Federation (Part Four) of 18 December 2006 No. 230-FZ, SPS “ConsultantPlus”] (Mar. 1, 2021), available at <https://www.consultant.ru/cons/cgi/online.cgi?req=doc&base=LAW&n=357900&dst=100000001%2C0#09427936808940447>.

¹⁰ Гаврилов Э.П. Право интеллектуальной собственности. Авторское право и смежные права. XXI век [Eduard P. Gavrilov, *Intellectual Property Rights. Copyright and Related Rights. The 21st Century*] 876 (2016).

technology is used in a variety of fields for the storage and processing of information, including banking and healthcare, as well as in the streamlining of the activities of legal entities in any field, the organization of document workflows in government agencies and so on.¹¹ Specific users may have requirements related to the operation of a cloud data storage application, which may necessitate changes to it. A cloud data storage application is typically provided to a user under the terms of the relevant licensing agreement.

It is important to distinguish between the modification and adaptation of computer programs. Modification denotes a change to the program, namely making material changes to it. According to subparagraph 9 of paragraph 2 of Article 1270 of the Civil Code of the Russian Federation (CCRF), the modification of a computer program means any change therein, except for adaptation, which is an amendment made exclusively for the purpose of running the computer program on a specific hardware of a user. An adaptation of cloud storage software would not necessitate the development of a new program. Thus, the main difference between a copyright-protected computer program and a literary work is that when an author's novel is published, no changes can be made in it because any change would be regarded as copyright infringement, whereas changes must be made in a computer program for the purpose of its proper operation, as well as keeping pace with scientific and technological progress.

According to paragraph 4 of Article 1260 of the CCRF, the authors of modified programs have the exclusive right to the derivative works as the independent objects of copyright, irrespective of the protection of the rights of the authors of the original cloud storage programs. It is advisable to focus on the well-known contradiction in the application of copyright to computer programs, because Article 1266 of the CCRF grants the right to the integrity of a work and Article 1270 of the same allows for the modification of computer programs with the modifiers required to indicate the name of the author of the initial program. At the same time, the CCRF does not include any specific criteria for the modification or for the institution in charge of the relevant expert examination and the comparison between the original and modified programs required to ensure that the new program is treated as a truly new subject of copyright.

The case law does not provide a clear answer as to whether a reworked or modified computer program should be treated as a new separate copyright item.¹² Russian courts that deal with copyright issues adjudicate the disputes in which various criteria are applied to define the novelty of a modified program. In order

¹¹ Marcelo Corrales et al., *New Technology, Big Data and the Law* 341 (2017).

¹² Ахмедов Г.А. Проблемы регулирования модификации программного обеспечения // Журнал Суда по интеллектуальным правам. 2020. № 2(28). С. 24 [Gadzhimurad A. Akhmedov, *Software Modification Regulation Problems*, 2(28) Journal of the Intellectual Property Rights Court 20, 24 (2020)].

to assess the changes made in such a program, an expert examination is typically required. It is important to consider the goal of the changes made in the program, which includes answering the following questions: what was the specific reason for the changes; is the program creative by its very nature; were the changes intended to change the functionality of the program? Additionally, the significance of the changes made to the program is also taken into account and special attention is paid to the changes made in the program's source code, as well as to the number of the processed and added fragments within this code. Attempts have been made to assess the changes in the program in terms of their percentage in the source code. However, this factor is not always recognized by the courts that hear cases involving intellectual property rights. There are examples when the changes in the source code have exceeded eighty-eight percent, but the courts failed to acknowledge the fact that a derivative program was created.¹³ Decisions to the contrary can also be found in case law when it was proven that no source code copying had occurred, but the court admitted a violation of the copyright of the holders of the source program.¹⁴ When determining an infringement of the rights of the holders of the source program, the courts consider the process of creating the new program, as well as the reasons for its creation. B. Gerasin, a Russian legal expert, notes that "the degree of significance cannot be determined as a percentage" and also emphasizes the importance of taking the "scope of designing and coding works" into account.¹⁵

In the context of the development of the digital economy, the criteria for determining material changes and modifications in software applications will be developed very soon in the Russian Federation and other BRICS member states. In the case of cloud storage software, modifications are feasible when the functionality of such software is being upgraded in order to meet the data protection requirements, as well as the needs of specific users. But, such upgrades must occur in parallel with the improvement of the data centers that are capable of ensuring the continued operation of software.

Legal entities typically hold the copyright for cloud storage software. In general, their license agreements for the use of such software include a prohibition on users

¹³ Постановление Суда по интеллектуальным правам от 21 ноября 2016 г. № С01-328/2016 // СПС «КонсультантПлюс» [Resolution of the Court for Intellectual Property Rights of 21 November 2016 No. S01-328/2016, SPS "ConsultantPlus"] (Apr. 28, 2021), available at <http://www.consultant.ru/cons/cgi/online.cgi?req=doc&ts=14417477404593098369405523&cacheid=21E7EF2EAB6B32EEF020D8034D3D326E&mode=splus&base=SIP&n=26250&rnd=0.2826176515801282#n7l3cukt1c>.

¹⁴ Определение Верховного Суда Российской Федерации от 2 октября 2017 г. № 305-ЭС17-13190 [Decision of the Supreme Court of the Russian Federation of 2 October 2017 No. 305-ES17-13190/2016, SPS "ConsultantPlus"] (Apr. 28, 2021), available at <http://www.consultant.ru/cons/cgi/online.cgi?req=doc&ts=14417477404593098369405523&cacheid=4F579E62953C8CFE16CDE943E0B68706&mode=splus&base=ARB&n=514502&rnd=0.2826176515801282#19u3azp3uu>.

¹⁵ Герасин Б.В. IT-споры в России: сегодняшние реалии // Судья. 2017. № 7. С. 33 [Boris V. Gerasin, *IT Disputes in Russia: Today's Realities*, 7 Judge 31, 33 (2017)].

making any changes to it. Information technology companies do not transfer their exclusive rights to software to the users, which is a wise solution in terms of copyright protection. On one hand, such restrictions hinder the development of new software. On the other hand, an initial author/copyright holder may have expended significant effort and expense in developing a sophisticated computer storage program, but granting permission for its modification by another person de facto minimizes the difficulty of the process of its creation.

The exclusive right to a work in Russia is valid until the end of the author's life and seventy years after the author's death.

Article 1301 of the RFCC establishes financial liability for copyright infringement. In addition, criminal penalties apply in cases of serious violations of copyright and related rights, such as misappropriation of authorship and illegal use of the items of copyright or related rights. This criminal liability may entail fines and/or imprisonment for up to six years.

Because the cloud storage software can only be efficiently operated on specialized hardware installed in the data center, a modification by another entity, namely, one that lacks the requisite technological infrastructure, would be of little importance to a cloud storage provider. Meanwhile, obtaining a patent for a data center that incorporates the cloud storage function would be the most effective way to protect intellectual property.

A software and hardware package may be patented in Russia as an invention. This is possible because only the computer program along with the data processing center which contributes to the cloud storage would be of interest to the copyright holder. At the same time, such a software and hardware package must be designed at the relevant level of invention and must also be characterized as having a certain amount of originality, novelty and industrial applicability that would confirm the uniqueness of the system and the functions of the data processing center. According to G. Ivliev, changes were introduced to the patentability assessment procedure in 2020, with the following amendments to the Civil Code of the Russian Federation: institutions accredited by Rospatent (RF Federal Service for Intellectual Property) may conduct expert examinations and provisional assessments of the patentability of inventions and utility models.¹⁶ If a data processing center equipped with the relevant computer program is declared to be an invention, experts from accredited research institutions and universities may be engaged and consulted, thus allowing them to determine whether or not the data processing center with cloud storage should be patented.

Data center patents are valid for twenty years under Article 1363 of the RFCC. Additional patents for the invention may be obtained in Russia, allowing for the improvement and upgrading of data centers.

¹⁶ *Ивлиев Г.П. Модернизация гражданского законодательства в сфере интеллектуальной собственности // Журнал российского права. 2021. Т. 25. № 1. С. 27–28 [Gregory P. Ivliev, *Modernization of Civil Legislation in the Field of Intellectual Property*, 25(1) Journal of Russian Law 23, 27–28 (2021)].*

Discussions are underway in Russia about the most efficient method of legal protection of computer programs, namely patent or copyright-based. Advocates of the patent-based protection believe that the patents contribute to investments in research work. A large number of patent applications support this viewpoint. The criteria for obtaining a patent, such as novelty and level of invention, are better suited to a software and hardware package designed for cloud storage. S. Sereda believes that patent-based protection is “more natural” for computer programs and that the features of technical systems and the mode of their development are taken into account by the system of patent protection of intellectual property rights in a fairly comprehensive manner.¹⁷ F. Saveliev is also in support of patent-based protection of rights of top computer programs because it allows for the protection of non-literary components of these programs¹⁸, such as the physical appearance of the program when it is displayed on a monitor screen.

On the other hand, patent-based protection has its own drawbacks. IT companies are actively trying to have their software solutions patented and a large number of patents are being issued for generalized algorithms. This could stifle innovation. Because this type of protection was initially conceived for the purpose of protecting new solutions in technology and inventions, determining the novelty, non-obviousness and usefulness of a software and hardware package may be difficult. A patent obtained by one company may have far-reaching implications, limiting the ability of other companies to design new computer programs.

2. Peculiarities of Information Technology Legal Protection in Brazil

The Federative Republic of Brazil has a high level of information technology development and intellectual property legislation. Brazil's legal system is influenced by Romano-Germanic law. Cloud data storage is governed by Law No. 9.610 on Copyright and Related Rights of 1998 (hereafter referred to as the “Brazilian Copyright Law”). Under Article 7 of this law, computer programs are intellectual works and copyright-protected items governed by the special provisions of this law.¹⁹ Under the Brazilian Copyright Law, only an individual may be the author, but this factor does not deprive the legal entities of their right to protection. Software in Brazil is also governed by specialized laws such as Law No. 9.609 of 1998 on the Protection of Intellectual Property

¹⁷ Середя С.А. Правовой подход к программному обеспечению: требуются изменения // Патенты и лицензии. 2004. № 1. С. 45 [Serge A. Sereda, *Legal Approach to Software: Changes Needed*, 1 Patents and Licenses 44, 45 (2004)].

¹⁸ Савельев А.И. Лицензирование программного обеспечения в России: законодательство и практика [Alexander I. Saveliev, *Software Licensing in Russia: Legislation and Practice*] 69 (2012).

¹⁹ Law No. 9.610 of 19 February 1998 on Copyright and Related Rights (Mar. 1, 2021), available at <https://www.wipo.int/edocs/lexdocs/laws/en/br/br002en.pdf>.

of Software, its Commercialization in the Country and Other Provisions (hereafter referred to as the “Brazilian Software Law”). This law was elaborated in accordance with Article 10 of the Agreement on Trade-Related Aspects of Intellectual Property Rights in order to avoid conflicts in bilateral relations. Decree No. 2.556 on the Brazilian Software Law was adopted in order to elaborate the Brazilian Software Law in detail.

Computer programs are treated as literary works in Brazil and they are afforded the necessary protection. Under point 1 of Article 2 of the Brazilian Software Law, the author has the right to claim the authorship of computer programs and oppose any unauthorized changes or modifications to them.²⁰

The registration of copyright for a work is optional and is carried out by a government agency legally appointed by the ministry in charge of the state policy in the fields of science and technology. According to S. Lahorgue Nunes, a Brazilian legal expert, software protection is not dependent on registration, but it is nevertheless important to have the source and object codes of a computer program registered in order to facilitate the confirmation of the copyright to software. S. Lahorgue Nunes further points out that when software is embedded in a technical device, the device may be patent-protected as an invention, while the software itself may be protected under the copyright regime.²¹

Under Article 9 of the Brazilian Software Law, the use of a software program, including cloud storage software, is the object of a licensing agreement. F. Barros Oquendo, a Brazilian legal scholar, draws attention to the inconsistency of this law: Article 10 declares as null and void any clauses that restrict the production, distribution or commercialization of software. At the same time, Article 2 of the same law grants the exclusive right to authorize or prohibit commercial leasing to the owners of software copyrights. The author points out that software copies may be sold, licensed or transferred in any other way without violating copyright laws.²² As a result, in some cases, an author or copyright holder may limit the scope of any potential modification to cloud storage software.

The laws provide for the ability to transfer computer program technology in accordance with the terms of the applicable licensing agreement. In this case, under Article 11 of the Brazilian Software Law, such an agreement must be registered with the National Institute of Industrial Property (INPI).²³ In order to accomplish this, the

²⁰ Law No. 9.609 of 19 February 1998 on the Protection of Intellectual Property of Software, its Commercialization in the Country, and Other Provisions (Mar. 1, 2021), available at <https://www.wipo.int/edocs/lexdocs/laws/en/br/br001en.pdf>.

²¹ *Security Rights in Intellectual Property* 150–151 (Eva-Maria Kieninger ed., 2020).

²² *Liability for Antitrust Law Infringements & Protection of IP Rights in Distribution* 409 (Pranvera Këllezi et al. eds., 2019).

²³ *Еременко В.И. О правовой охране интеллектуальной собственности в Бразилии // Изобретательство. 2013. Т. 13. № 3. С. 1–12 [Vladimir I. Eremenko, On the Legal Protection of Intellectual Property in Brazil, 13(3) Invention Activities 1 (2013)].*

provider of the technology must deliver to its recipient the complete documentation, including the commented source-code, functional specifications and any other technical data required for the technology to be absorbed.

The principle of social function of a contract, as affirmed in Article 421 of the Civil Law of Brazil, is applicable in this country. This principle streamlines the legal relationships pertaining to intellectual property. It aims to reduce contradictions in situations where the profits of the author or copyright holder involved in the creation of an intellectual property item are lower than the profits of the party that has obtained the right to dispose of this item.

The Brazilian Software Law stipulates the civil and criminal penalties for violations. A violation of the rights of the author of a software program is punishable by a six-month to two-year imprisonment or fine under Article 12 of this Law. If the violation consists of the full or partial reproduction, by any means, of a software program for commercial purposes, the perpetrator faces a penalty of one to four-year prison sentence and fine. According to Article 41 of the Brazilian Software Law, the economic rights of authors are protected for seventy years from the time of their death.

In Brazil, the issues concerning the obtaining of patents for inventions are resolved in accordance with Law No. 9.279 of 1996, which governs the rights and obligations pertaining to industrial property (hereafter referred to as the “Law No. 9.279”). Under Article 10 of the Law No. 9.279, computer programs are not considered inventions or utility models.²⁴ A data center may be patented if it meets the novelty criteria, has the required levels of invention and has industrial applicability, namely, the ability to be used in any sphere, though this may be difficult. The international novelty is taken into account in Brazil, just as in many other countries. As a result, applications that have become available and widely known in other countries cannot be patented in this country. In this case, just as in other countries, the data center must be a unique technical complex that facilitates the operation of the cloud storage software and ensures its stability and functionality based on its computing capacities.

If the data center is patented, the applicant or patent holder may obtain an additional certificate of invention by paying the special fee specified in Article 76 of the Law No. 9.279. The applicant receives this certificate in order to protect a potential improvement or development of the invention, even if it lacks inventive activity, as long as it shares the same inventive concept. As a result, when a patent is obtained for the data center that incorporates the cloud storage software, the holder of this patent, upon receipt of the relevant certificate, may subsequently engage in the improvement of the center’s hardware and software, allowing such a holder to rise to prominence in the country’s IT sector. In Brazil, the patent for a data center as an invention is usually issued for a period of twenty years and cannot be issued for less than ten years under Article 40 of the Law No. 9.279.

²⁴ Law No. 9.279 of 14 May 1996 (Mar. 1, 2021), available at <https://www.wipo.int/edocs/lexdocs/laws/en/br/br003en.pdf>.

Therefore, a distinctive feature of the IT sector in the Federative Republic of Brazil is its high level of protection of cloud data storage software due to the ability to limit the scope of third party modifications of the computer program and the complex that would incorporate the patented data center and the software.

3. Indian Cloud Storage Software Copyright and Patent Protection System

India and China are the leaders among BRICS member states in the areas of IT development, training of IT specialists and drafting of IT-related laws. The Indian Copyright Act of 1957 is an integrated document that covers not only the rights of authors, but also matters of international private law and the activities of the Copyright Office. The Copyright Rules of 2013 are an important by-law in the sphere of copyright protection. In terms of the regulations that govern the relationships that pertain to computer programs, the Indian Information Technology Act of 2000 should be noted as the Act that formalized the regulatory base for new information technologies, as well as their legal definitions that are not included in the Indian Copyright Act. Noteworthy is the fact that the Indian Information Technology Act contains no definition of cloud data storage.

The Indian Copyright Act of 1957 considers computer programs to be literary works. Under this law, a computer program is a set of instructions articulated in words, codes, layouts or other forms, including those that are machine-readable, that can be used to achieve a specific objective with the help of a computer. Article 2 of this Act states that a work is considered Indian, namely, governed by Indian laws, if any of the following conditions are met: 1) its author is a citizen of India; 2) the first publication or demonstration of the work (computer program) took place in India; 3) the work (computer program) has not been published but its author was a citizen of India at the time of its creation.²⁵

The author may register his copyright to a computer program in India by filing the relevant application with the Registrar of Copyrights. Article 18 of the Indian Copyright Act allows for the assignment of copyright in whole or in part. It is common practice in India to use licensing agreements to provide computer programs to their users. The Copyright Office monitors the parties' compliance with their obligations under such agreements and in instances when the licensing of computer programs is mandatory, the Registrar of the Copyright Office may demand that the user remit his allocations under the licensing agreement to a public account in India. This account has been designated by the Board of Appeals, (the agency established under the Trademark Act of 1999 and acting in conjunction with the Copyright Office) in order to enable the author/copyright holder to receive remuneration under the agreement.

²⁵ The Copyright Act, 1957 (14 of 1957) (Feb. 24, 2021), available at <https://copyright.gov.in/documents/copyrightrules1957.pdf>.

Article 30 of the Indian Copyright Act of 1957 allows for the modification or adaptation of literary works for technical purposes without infringing on the rights of the authors of the works in question, namely, computer programs. As established by Article 57 of the same, the author of a work has the right to claim authorship of the work and to restrain or claim damages in respect of any distortion, mutilation, modification or other act in relation to the said work even after the assignment of the copyright. In the case of a computer program, failure to display an adaptation is not deemed an infringement of the rights. It is worth noting that Article 32 of the Indian Copyright Act allows for the granting of a license to produce and publish a translation of a literary work after a certain period of time has passed since the first publication of such work. It appears that the same can be said of computer programs. Under Article 22 of the Indian Copyright Act, a copyright subsists in any work published during the author's lifetime and for sixty years after the author's death.

Severe punishment is stipulated in India for the use of an infringing computer program. Under Article 63B of the Indian Copyright Act, a person liable for such actions is punishable by imprisonment for a term that cannot be less than seven days but which may be as long as three years. Under Article 52 of this law, the storing of any computer program when it is not in use does not constitute an infringement of copyright.

The Patents Act of India was based on the provisions of the United Kingdom Patents Act of 1949. The current version of this Act applies the international novelty, inventive step and industrial applicability criteria to inventions. The initial version of this Act did not include the international novelty criterion; instead, only the local novelty was applied. In addition, the Patents Rules of 2003 are also in effect in India.

The Patents Act of India of 1970 contains a detailed list of items that are not patentable. For example, computer programs and algorithms are not patented inventions under paragraph "k" of Article 3 of this law.²⁶ T.G. Agita, an Indian legal expert, believes that protection by patent in India requires greater originality than protection by copyright; and that originality for such copyright-based protection means that a work has been created by the author individually.²⁷

4. Cloud Storage Software as an Object of Copyright and Patent Law in China

In China, as in India, the government is primarily concerned with the development of the country's IT sector. The copyright for computer programs is governed by the Copyright Law of the People's Republic of China (PRC) dated 1990 (last version

²⁶ The Patents Act, 1970 (Mar. 1, 2021), available at https://www.ipindia.gov.in/writereaddata/Portal/IPOAct/1_31_1_patent-act-1970-11march2015.pdf.

²⁷ *Copyright Law in the Digital World: Challenges and Opportunities* 22 (Manoj Kumar Sinha & Vandana Mahalwar eds., 2017).

adopted in 2010). Such programs may be created by legal entities. Under Article 3 of this law, computer software is considered to be a “work.”²⁸ The author’s rights become effective at the time of the creation of a computer program, and the copyright registration makes it possible to determine the exact date and time at which the program was initiated in the event of a legal dispute. The registration process is voluntary and is handled by the Copyright Protection Center of China. According to J. Wang, a legal expert, copyright protection is based on the principle of culpability, which refers to the intentional harm inflicted by an infringer on an author or copyright holder. Liability for copyright infringement is severe and it entails a significant financial penalty.²⁹ Moreover, Mr. Wang believes that the terms of licensing agreements should be scrutinized more closely.

In China, copyright of an individual to a computer program is protected during the individual’s lifetime and fifty years after the individual’s death. When a copyright is held by a legal entity or an organization, the term of its protection shall be fifty years after the first publication of the respective work (Art. 21 of the Patent Law of the People’s Republic of China).

Under Article 16 of the Regulation for Computer Software Protection of the People’s Republic of China, a cloud storage software user may make necessary alterations to the software in order to implement it in an actual environment of computer application or to improve its functions or performance, provided that such user does not, unless otherwise agreed in the contract, offer the altered software to any third party without permission from the relevant copyright owner.³⁰

Under Article 23 of the Regulation for Computer Software Protection of the People’s Republic of China, civil liability is stipulated in respect of anyone who commits an infringement of the rights of the author or holder of copyright by publishing, registering or altering a piece of software without the permission of its author/holder.

Under Article 24 of the same, when a copyright infringement jeopardizes the public interest, the copyright administration department may impose a fine, confiscate the material, tools and equipment primarily used to produce infringing copies; and investigate criminal liability where the law is violated. This document contains a contradiction, in that, according to Article 29 thereof, the development of a piece of software that is similar to a pre-existing one due to a limitation of

²⁸ Copyright Law of the People’s Republic of China, promulgated by the Standing Committee of the National Congress on 26 February 2010 and entered into force on 1 April 2010 (Feb. 2, 2021), available at <https://www.wipo.int/edocs/lexdocs/laws/en/cn/cn031en.pdf>.

²⁹ Jia Wang, *Conceptualizing Copyright Exceptions in China and South Africa: A Developing View from the Developing Countries* 179 (2018).

³⁰ Regulations on Computers Software Protection, Decree of the State Council of the People’s Republic of China No. 339, effective as of 1 January 2002 (Feb. 24, 2021), available at <https://www.wipo.int/edocs/lexdocs/laws/en/cn/cn002en.pdf>.

alternative forms of expression does not constitute an infringement of the copyright in the pre-existing one.

The Patent Law of the People's Republic of China dated 1984 does not preclude the obtaining of patents for computer programs (see Art. 25), but such an item of intellectual property is essentially protected by the Chinese copyright laws.³¹ In 2018, the Standing Committee of the Chinese National People's Congress made a significant contribution to the development of the legal framework of the patenting process: a special examination is now stipulated for sophisticated inventions and software, implying that a higher level of technical knowledge may be required for the examination of the relevant patent applications. Appeals against the decisions of the first instance courts are considered by the Supreme People's Court of China,³² thus stressing the importance of this sphere of activity. Patents for data centers, as well as inventions incorporating cloud storage software are issued for twenty years with the payment of an annual fee (Arts. 45 and 46 of the Patent Law of the People's Republic of China). This law does not stipulate the issuance of an additional patent for data center improvement.

Patent protection of software is not widely available in China and algorithms for cloud storage programs are typically not protected by patents, with software registration serving as the primary means of protection.

It is worth noting that the special PRC Regulations for the Protection of Computer Software have been in effect in China since 2001. It governs the development, use and distribution of software. The term "computer software" refers to a computer program that includes the necessary documentation. When an individual or a legal entity provides computer programs to a foreign counterparty, the provisions of the PRC Regulations on Administration of Import and Export of Technique from 2001 must be followed.

5. Special Aspects of Cloud Storage Software Regulation in the Republic of South Africa

In the Republic of South Africa, the IT sector is rapidly developing and the regulations that govern it are improving. This country joined BRIC in 2011, resulting in a change in the name of this organization which is now called BRICS. The RSA is one of the most developed African countries in terms of law, industry and the economy. It is one of the regional leaders in the production of energy resources and its energy sector is closely linked to intellectual property regulation and development. At present, the Republic seeks to develop the digital economy and make use of cloud data storage facilities.

³¹ Patent Law of the People's Republic of China, adopted at the Fourth Session of the Standing Committee of the Sixth National People's Congress on 12 March 1984 (Feb. 28, 2021), available at <https://www.wipo.int/edocs/lexdocs/laws/en/cn/cn006en.pdf>.

³² Giovanni Pisacane & Daniele Zibetti, *Intellectual Property in China* 13 (2020).

As noted by S. Karjiker, a South African legal scholar, intellectual property is protected in the country under the relevant general laws. Copyright, trademarks, industrial designs, patents and crop breeders' rights are based on legislative acts, whereas unfair competition is governed by general laws (including information disclosure). S. Karjiker points out that while intellectual property regulation is not mentioned in the RSA Constitution, it is a component of property in general.³³

The perception of the key examples of the island-based legal tradition influenced the creation of laws that govern the protection of intellectual property. In South Africa, the basic law in this sphere is the Copyright Act No. 98 of 1978. This Act is substantiated by Copyright Instruction No. 6265 of 1978. Computer programs in the RSA are works eligible for copyright protection (Art. 2 of the Copyright Act), but they are not included in the list of literary works. Meanwhile, tables or compilations can be stored in a computer program. A computer program is a set of instructions that is fixed or stored in any manner and that, when used directly or indirectly in a computer, directs its operation to produce a result (Art. 1 of the RSA Copyright Act).³⁴

Copyright on a computer program is valid for fifty years, from the time it is made available to the public or when it is first published.

Article 11B of the RSA Copyright Act allows for the adaptation of a computer program. According to the law, an adapted computer program may include: (i) a version of the program in a programming language, code or notation different from that of the program; or (ii) a fixation of the program in or on a medium other than the medium of fixation of the program. Under Article 20 of the RSA Copyright Act, an author may provide the cloud storage software to a third party for use and may object to any modification thereof, provided that such author does not prevent or object to modifications that are absolutely necessary on technical grounds or for the purpose of commercial exploitation of the program.

The patent-related laws of the RSA were heavily influenced by the United Kingdom Patents Act of 1977. These laws have evolved over time, with the most recent version being the RSA Patents Act No. 57 of 1978, which is currently in effect. The Patent Instruction of 1978 as well as the Patent Expertise Instruction of 2003 applies along with this law.

Under Article 25 of the RSA Patents Act, a computer program, like a literary work, does not qualify as an invention. In South Africa³⁵ as in other countries, a data center can be patented as an invention. However, such a data center must meet the patentability criteria, which include novelty and inventive step (it is also necessary for

³³ *Security Rights in Intellectual Property*, *supra* note 21, at 605–606.

³⁴ Copyright Act 98 of 1978 (Mar. 3, 2021), available at <https://www.gov.za/documents/copyright-act-16-apr-2015-0942#>.

³⁵ Patents Act 57 of 1978 (Mar. 3, 2021), available at <https://www.gov.za/documents/patents-act-9-apr-2015-0827>.

an invention to meet the requirements of Article 25 of the Law). The RSA Patents Act differs from the Acts analyzed above in that its patentability criteria do not include industrial applicability. The international novelty criterion is applied in the RSA in the same way as it is in other countries. The term of effect for a patent in South Africa is twenty years from the date of filing of the relevant application, provided that the established annual fees are paid (Art. 26 of the RSA Patents Act). It is worth noting that the provisions regarding the additional patents for improvements or alterations are also applicable in the RSA. Such additional patents are issued for the same period of time as the basic patents.

6. German and United States Approaches to Cloud Storage Software Regulation Compared with BRICS Countries

For comparison purposes, we will analyze the approaches of Germany, a EU Member State, and the United States in the field of legal regulation of computer program use in areas where they differ from the legal systems of the BRIC countries. The German legal system shares features with the Russian legal system, while the Anglo-Saxon legal system is distinct in its own right. Significant attention is paid to the development of the IT sector in terms of both technology and law. This sector has been rigorously regulated and there are numerous judicial precedents relating to it.

In Germany, copyright to computer programs is protected by the Copyright and Related Rights Act of 1965 and the Directive 2009/24/EC of the European Parliament and of the Council of 23 April 2009 on the legal protection of computer programs. Section 2 of the German Act states that computer programs are copyright-protected just as works in the same way that literary, scientific and artistic works are.³⁶ Under Section 69a of the same Act, protects not only ready-made programs but also their drafts are subject to copyright protection, and they are protected if they represent individual works.

Under point 3 of Section 69a of the Copyright and Related Rights Act of the Federal Republic of Germany, computer programs shall be protected if they represent individual works in the sense that they are the result of the author's own intellectual creation. No other criteria, particularly qualitative or aesthetic criteria, shall be used to determine its eligibility for protection. The use of the program's source code requires consent of the copyright holder. The Copyright and Related Rights Act contains a list of cases (§ 69e) in which the authorization of the copyright holder is not required, such as when changes are required to install the program.³⁷ Under

³⁶ Gesetz über Urheberrecht und verwandte Schutzrechte (Urheberrechtsgesetz) 09.09.1965 (geändert 26.11.2020) (Jan. 21, 2021), available at <https://www.gesetze-im-internet.de/urhg/BJNR012730965.html>.

³⁷ *Antitrust Analysis of Online Sales Platforms & Copyright Limitations and Exceptions* 602 (Bruce Kilpatrick et al. eds., 2018).

Section 64 of this law, the copyright expires seventy years after the author's death. The Copyright Office is in charge of registering computer programs which is entirely voluntary. Similar provisions are included in Directive 2009/24/EC.

In Germany, financial liability is stipulated for cases of infringement of the rights of copyright holders for cloud storage software.³⁸ The Copyright and Related Rights Act gives special consideration to the potential harm that may be caused to the copyright holders. In addition, a court may issue in cases of infringement of copyright holders' rights (Sec. 64 of the Copyright and Related Rights Act of the Federal Republic of Germany). Criminal liability is applied to an infringer in cases of damage to public interest. Matters related to the exhaustion of copyright to software are widely discussed in German academic literature as the distribution and use of software via the Internet reduces the copyright holders' ability to exercise control over the use and infringement of copyright.

In Germany, a computer program is patent-protected when it is considered an invention, which includes software and hardware components. As in many other countries, patents in Germany are granted for any inventions, that are new, involve an innovative step and are capable of industrial application, as stipulated by Section 1 of the German Patent Act of 1936 (the most recent version of which was adopted in 2017).³⁹ Under Section 20 of this law, a patent is valid for a period of twenty years from the date of filing the application for it. In accordance with Section 1 of the same, a computer program is not considered an invention subject to patenting. As a result, a patent can only be obtained for a software and hardware package incorporating not only the relevant computer program, but also the novel technological tools required for data processing. Such provisions are also applicable at the EU level. The German Patent and Trademark Office plays an important role in the regulation of copyright and intellectual property. It accepts patent applications and registers the transactions that serve as the basis for the transfers of registered rights under licensing agreements.

In the United States, where computer programs appeared earlier than in many other countries, the copyright is regulated at the federal level. The main legal Acts in this sphere are the United States Copyright Act of 1976 and the United States Digital Millennium Copyright Act of 1998. Computer programs as the aggregates of data and commands required for the operation of computing devices must meet the following criteria: they must be represented in material form (electronic form is allowed depending on the digitization); they must be original or creative nature and they must serve a useful purpose.

³⁸ *Compatibility of Transactional Resolutions of Antitrust Proceedings with Due Process and Fundamental Rights & Online Exhaustion of IP Rights* 679 (Bruce Kilpatrick et al. eds., 2016).

³⁹ Patentgesetz (Deutschlands) 05.05.1936 (geändert 08.10.2017) (Jan. 21, 2021), available at <https://www.gesetze-im-internet.de/patg/BJNR201170936.html>.

Article 117 of the U.S. Copyright Act allows for an adaptation of a computer program when it is created as an essential step in the utilization of the computer program in conjunction with a machine.⁴⁰ Adaptations may be sold or otherwise transferred to third parties only with the authorization of the copyright owner. Article 106A of this law enshrines the right to authorship and integrity, which means that an author has the right to claim authorship of a computer program and to prevent the use of their name as the author of the work in the event of a distortion, mutilation, or other modification of the work that would be detrimental to his/her honor or reputation.⁴¹

Copyright in the United States protects not only the source code of a computer program, but also its structure,⁴² the sequence of its creation and the way in which it is organized. In such situations, all of these categories must be original. Various tests are used to determine the originality, such as the abstraction-filtration-comparison test (proposed in the course of the examination of *Computer Associates International, Inc. v. Altai, Inc.*, 1992⁴³).

The United States Copyright Act stipulates the protection of source and object codes, as well as preparatory and audiovisual materials. The algorithm of a program is subject to special protection because it can serve as the basis for various modifications of that program. The algorithm is protected within the framework of patent law. Moreover, only the algorithms that cannot be implemented by human effort and thus require interaction with a machine are subject to such protection.

Legal entities in the U.S. may act as the authors of computer programs. Despite the fact that registration is not mandatory but recommended, it may serve as the pre-condition for filing a lawsuit in federal court. According to paragraph 410 of Title 17 of the United States Code (U.S.C.), the registration of a computer program places its author in a privileged position in comparison to other people.⁴⁴ In order to establish the fact of copyright infringement by the claimant the respondent would first challenge the claimant's certificate of authorship, namely, the legitimacy of the registration of his copyright to the program. Copyright registration is carried out by the Library of the U.S. Congress. Under Article 302 of the U.S. Copyright Act, the

⁴⁰ U.S. Copyright Act of 1976, 17. U.S.C. §§ 101 et seq.

⁴¹ Новоселова Л.А., Рузакова О.А. Значение и функции регистрации авторских прав в Российской Федерации и за рубежом // Вестник Пермского университета. Юридические науки. 2017. № 37. С. 341 [Liudmila A. Novoselova & Olga A. Ruzakova, *The Value and Functions of Copyright Registration in the Russian Federation and Abroad*, 37 Perm University Herald. Juridical Sciences 334, 341 (2017)].

⁴² Чурилов А.Ю. Проблема охраны программ для ЭВМ // Вестник Саратовской юридической академии. 2020. № 1. С. 97 [Alexey Iu. Churilov, *The Problem of Protection of Computer Programs*, 1 Bulletin of the Saratov Law Academy 94, 97 (2020)].

⁴³ *Computer Associates International, Inc. v. Altai, Inc.*, 982 F.2d 693 (2^d Cir. 1992).

⁴⁴ U.S. Code Title 35. Patents (Mar. 3, 2021), available at <https://www.wipo.int/edocs/lexdocs/laws/en/us/us176en.pdf>.

author's copyright in a work lasts for the duration of the author's life and seventy years after the author's death.

Under Article 101 of the United States Code Title 35 – Patents, whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent for the invention or discovery in question. As a result, the law allows patent protection for both cloud storage software and data centers. Under Article 154 of the United States Code Title 35 – Patents, the term of a patent is twenty years from the date the application for such patent was filed. There is no concept of an additional patent in the United States.

A notable example in United States case law is *Alice v. CLS Bank* of 2014 in which a computer program that consists of an abstract idea is ineligible for patent protection.⁴⁵ The court decision on this case had a major impact on the software development and patenting in the United States. According to scholar Y. Li, more than 400 patent applications were invalidated by mid-2018 in the U.S. It is difficult to determine whether this court decision had a positive or negative effect. On one hand, it led to a decrease in the number of 'bad' patents and to the introduction of new approaches in the sphere of software development. On the other hand, the legal experts noticed an uncertainty in the software patenting process.⁴⁶ A two-stage test is used in the U.S. for software patenting purposes (the test was developed on the basis of the *Mayo Collaborative Services v. Prometheus Laboratories* case from 2012).⁴⁷ The initial question was whether or not the patent formula repeated a law of nature or an abstract idea; if so, the question was whether or not something greater was added to the formula to transform this "law of nature" or "abstract idea" into an acceptable subject of patent.

Conclusion

From the viewpoint of copyright, a computer program is a special item because its creative element can be seen not in the formula of the source code, but rather in the ideas, functions and operations of the program that manifest themselves during the course of its use and are not copyright-protected. The program's source code, algorithms and formulas do not always meet the originality criterion, but this does not diminish the need for legal protection.

Holders of cloud storage databases are fully protected by copyrights or patents. Copyright protection is provided to computer programs in all of the countries mentioned above. In contrast, patent-based protection is only possible when cloud

⁴⁵ *Alice Corp. v. CLS Bank International*, 573 U.S. 208 (2014).

⁴⁶ Yahong Li, *The Current Dilemma and Future of Software Patenting*, 50(9) IIC Int. Rev. Intellect. Prop. Compet. L. 823, 824–25 (2019).

⁴⁷ *Mayo Collaborative Services v. Prometheus Laboratories, Inc.*, 566 U.S. 66 (2012).

storage is regarded as a function of the relevant software and hardware package, in which case copyright holders would be required to show the truly innovative technological complexes.

There were discussions in the 1970s and 1980s about how to protect software, and whether to use patents, copyright, or sui generis protection as a means of doing so. The World Intellectual Property Organization (WIPO) expressed the opinion that software should be copyright-protected and that the software/hardware package may be patented. In general, this viewpoint was considered by WIPO member states as acceptable.⁴⁸

All of the BRICS member states do not allow for patenting computer programs in their laws. Obtaining a patent for a computer program in the BRICS countries, as well as in Russia, United States, and Germany, is not an easy task because one must justify the originality of software and hardware.

As seen in Brazil, most of the BRICS member states (Russia, India, South Africa) allow for the acquisition of additional patents for data centers as inventions or certificates. Despite the fact that the structure of an additional patent is outdated in terms of the global development of patent laws, its inclusion in these laws is an important factor for the improvement of the IT sector because new technological solutions are being developed on an ongoing basis, a process that is inherent to the sector's development.

Patents are valid for twenty years in all the BRICS countries under consideration, as well as in other countries, such as the United States and Germany. Such a period seems to be quite long for a sector such as IT, where innovations appear almost every year. From this viewpoint, the copyright protection of cloud storage software appears preferable. Despite the fact that obtaining patents itself is a protracted and complicated process.

The obtaining of a patent for a data center is more justifiable because the data center can be both an invention and a complex technological structure. However, the twenty year term of effect for this innovation is too long. Perhaps, for software and hardware innovations, the term of effect of a patent could be reduced to seven years. This would allow for the patenting of such innovations, as well as providing them with a high level of security, without impeding the IT development in the member states.

Obtaining a patent for cloud storage software, as permitted in the United States, is a time-consuming task. In some of the BRICS Member States, the availability of software patenting may retard the processes of development and use of innovative technologies. As a result, this may have an adverse effect on national economies.

In all of the countries under review an author has the right to register his computer program, and registration provides him with guarantees in the event of

⁴⁸ Copyright Protection of Computer Software, WIPO (Apr. 25, 2021), available at <https://www.wipo.int/copyright/en/activities/software.html>.

a dispute, since the copyright for it would be defined and the dates of its creation and registration would be fixed.

It is noteworthy that there is some convergence of approaches in India and Germany in terms of registration of licensing agreements, but such registration is not feasible in relation to massive transactions when the users accept the terms of licenses. However, the registration of licensing agreements may be an efficient tool for copyright protection. It is significant that India applies one of the toughest measures of liability for the use of non-licensed software. According to, A. Marsoof and I. Gupta, Indian legal experts, India's approaches towards copyright regulation are unique. This is evident from the strict liability for violations of the law, as well as the caution advised to subjects of legal relationships at the time of their establishment.⁴⁹ Some BRICS countries, as well as the United States and Germany, have enacted legislation establishing criminal liability for copyright infringement. However, such measures are not widespread and are typically used only when the public interests are jeopardized.

The adaptation and modification of cloud storage software is well streamlined in the BRICS member states. The adaptation is allowed in all of the countries under review and is limited only to the technical changes that must be made to the software in order for the users to be able to work on it. In the case of the modification, the situation is different. Authors and copyright holders have the right to declare their right to the software and prohibit any changes to its structure, especially if the changes will have a negative impact on his or her good name and reputation. As a result, changes can only be made with the consent from the author/copyright holder. Typically, a contract for cloud storage of data specifies that the user is prohibited from altering the informational structure of the program or making any changes in its source code. All intellectual property rights in such a program are granted to the provider of the cloud storage facility.

It is important to establish the criteria for defining the originality and novelty of a computer program in the BRICS member states because such criteria may differ in judicial practices, as well as in the legal and technical books. These criteria would help in determining the level of modification, namely, to find out whether the program is a real innovation or a minor variation of the existing program. The exchange of experience between the BRICS countries may be effective and would contribute to the development of laws and technologies in each of them.

The foregoing analysis of the means of protecting cloud data storage programs strongly indicates that, regardless of the specific features of such programs, their legal protection may be rendered quite efficiently on the basis of the traditional copyright and patent frameworks. It is noteworthy that the emphasis in the laws and legal practices of Russia and the world's leading countries is not on the invention of new

⁴⁹ Althaf Marsoof & Indranath Gupta, *Shielding Internet Intermediaries from Copyright Liability – A Comparative Discourse on Safe Harbours in Singapore and India*, 22(3-4) J. World Intellect. Prop. 234, 262 (2019).

methods of regulation that would be in line with the current state of the technological sphere, but rather on the expansion of the items of individual (including intellectual) property that are subject to legal protection. According to, S. Alexeev, the key factor is the recognition of these relationships as full-fledged property items.⁵⁰ This recognition would raise the level of protection for owners and copyright holders of the cloud data storage applications in the environment of accelerated modernization of the economy on its way to the stage of post-industrial development.

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⁵⁰ Алексеев С.С. Право собственности. Проблемы теории [Sergey S. Alekseev, *Property Rights: Problems of Theory*] (2007).